

Length/ Dia	0.375	0.438	0.500	0.563	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000	2.250	2.500	2.750	3.000	3.250	3.500	3.750	4.000
2.000	0.055	0.074	0.108	0.135	0.184	0.287	0.424	0.586	0.813	1.057	1.348	1.695	2.101	2.591	3.042	3.687	5.109	6.740	8.670	10.998	13.637	17.115	20.384	24.261
2.250	0.057	0.078	0.113	0.141	0.192	0.299	0.440	0.607	0.840	1.091	1.390	1.746	2.161	2.661	3.123	3.780	5.227	6.888	8.849	11.212	13.890	17.409	20.739	24.665
2.500	0.060	0.082	0.118	0.148	0.200	0.310	0.456	0.628	0.868	1.125	1.433	1.797	2.220	2.731	3.204	3.872	5.345	7.035	9.028	11.427	14.142	17.704	21.094	25.068
2.750	0.063	0.086	0.123	0.154	0.208	0.322	0.472	0.650	0.895	1.160	1.475	1.847	2.280	2.801	3.286	3.965	5.464	7.182	9.207	11.641	14.394	17.998	21.449	25.472
3.000	0.066	0.089	0.129	0.161	0.216	0.334	0.489	0.671	0.923	1.194	1.517	1.898	2.340	2.871	3.367	4.057	5.582	7.330	9.386	11.855	14.647	18.292	21.804	25.876
3.250	0.069	0.093	0.134	0.167	0.224	0.345	0.505	0.692	0.950	1.228	1.559	1.948	2.400	2.942	3.448	4.150	5.701	7.477	9.565	12.070	14.899	18.586	22.159	26.279
3.500	0.071	0.097	0.139	0.173	0.232	0.357	0.521	0.713	0.978	1.263	1.602	1.999	2.460	3.012	3.529	4.242	5.819	7.624	9.744	12.284	15.152	18.880	22.514	26.683
3.750	0.074	0.101	0.144	0.180	0.240	0.369	0.537	0.734	1.005	1.297	1.644	2.049	2.520	3.082	3.610	4.335	5.938	7.772	9.923	12.499	15.404	19.174	22.869	27.087
4.000	0.077	0.105	0.149	0.186	0.248	0.380	0.553	0.755	1.033	1.331	1.686	2.100	2.580	3.152	3.691	4.428	6.056	7.919	10.102	12.713	15.657	19.468	23.224	27.491
4.250	0.080	0.108	0.154	0.193	0.256	0.392	0.570	0.776	1.060	1.365	1.728	2.150	2.640	3.222	3.772	4.520	6.174	8.066	10.281	12.927	15.909	19.762	23.579	27.894
4.500	0.082	0.112	0.159	0.199	0.264	0.404	0.586	0.797	1.088	1.400	1.771	2.201	2.699	3.292	3.854	4.613	6.293	8.214	10.460	13.142	16.162	20.056	23.934	28.298
4.750	0.085	0.116	0.164	0.205	0.272	0.416	0.602	0.818	1.115	1.434	1.813	2.251	2.759	3.363	3.935	4.705	6.411	8.361	10.639	13.356	16.414	20.351	24.289	28.702
5.000	0.088	0.120	0.169	0.212	0.280	0.427	0.618	0.839	1.143	1.468	1.855	2.302	2.819	3.433	4.016	4.798	6.530	8.508	10.818	13.570	16.667	20.645	24.644	29.105
5.250	0.091	0.124	0.174	0.218	0.288	0.439	0.634	0.860	1.170	1.503	1.897	2.353	2.879	3.503	4.097	4.890	6.648	8.656	10.997	13.785	16.919	20.939	24.999	29.509
5.500	0.094	0.128	0.179	0.225	0.296	0.451	0.651	0.881	1.198	1.537	1.939	2.403	2.939	3.573	4.178	4.983	6.767	8.803	11.177	13.999	17.172	21.233	25.354	29.913
5.750	0.096	0.131	0.184	0.231	0.304	0.462	0.667	0.902	1.225	1.571	1.982	2.454	2.999	3.643	4.259	5.075	6.885	8.950	11.356	14.214	17.424	21.527	25.709	30.317
6.000	0.099	0.135	0.190	0.238	0.312	0.474	0.683	0.924	1.253	1.605	2.024	2.504	3.059	3.713	4.340	5.168	7.003	9.097	11.535	14.428	17.677	21.821	26.064	30.720
6.250	0.102	0.139	0.195	0.244	0.320	0.486	0.699	0.945	1.280	1.640	2.066	2.555	3.119	3.784	4.422	5.260	7.122	9.245	11.714	14.642	17.929	22.115	26.419	31.124
6.500	0.105	0.143	0.200	0.250	0.328	0.497	0.715	0.966	1.308	1.674	2.108	2.605	3.179	3.854	4.503	5.353	7.240	9.392	11.893	14.857	18.181	22.409	26.773	31.528
6.750	0.108	0.147	0.205	0.257	0.336	0.509	0.731	0.987	1.335	1.708	2.151	2.656	3.238	3.924	4.584	5.445	7.359	9.539	12.072	15.071	18.434	22.704	27.128	31.931
7.000	0.110	0.150	0.210	0.263	0.344	0.521	0.748	1.008	1.363	1.743	2.193	2.706	3.298	3.994	4.665	5.538	7.477	9.687	12.251	15.285	18.686	22.998	27.483	32.335
7.250	0.113	0.154	0.215	0.270	0.352	0.532	0.764	1.029	1.390	1.777	2.235	2.757	3.358	4.064	4.746	5.630	7.595	9.834	12.430	15.500	18.939	23.292	27.838	32.739
7.500	0.116	0.158	0.220	0.276	0.360	0.544	0.780	1.050	1.418	1.811	2.277	2.807	3.418	4.134	4.827	5.723	7.714	9.981	12.609	15.714	19.191	23.586	28.193	33.143
7.750	0.119	0.162	0.225	0.282	0.368	0.556	0.796	1.071	1.445	1.846	2.319	2.858	3.478	4.204	4.908	5.815	7.832	10.129	12.788	15.928	19.444	23.880	28.548	33.546
8.000	0.122	0.166	0.230	0.289	0.376	0.567	0.812	1.092	1.473	1.880	2.362	2.908	3.538	4.275	4.990	5.908	7.951	10.276	12.967	16.143	19.696	24.174	28.903	33.950
8.250	0.124	0.169	0.235	0.295	0.384	0.579	0.829	1.113	1.500	1.914	2.404	2.959	3.598	4.345	5.071	6.000	8.069	10.423	13.146	16.357	19.949	24.468	29.258	34.354
8.500	0.127	0.173	0.240	0.302	0.392	0.591	0.845	1.134	1.528	1.948	2.446	3.010	3.658	4.415	5.152	6.093	8.188	10.571	13.325	16.572	20.201	24.762	29.613	34.757
8.750	0.130	0.177	0.245	0.308	0.400	0.602	0.861	1.155	1.555	1.983	2.488	3.060	3.717	4.485	5.233	6.185	8.306	10.718	13.504	16.786	20.454	25.056	29.968	35.161
9.000	0.133	0.181	0.250	0.314	0.408	0.614	0.877	1.177	1.583	2.017	2.531	3.111	3.777	4.555	5.314	6.278	8.424	10.865	13.683	17.000	20.706	25.351	30.323	35.565
9.250	0.136	0.185	0.256	0.321	0.416	0.626	0.893	1.198	1.610	2.051	2.573	3.161	3.837	4.625	5.395	6.370	8.543	11.013	13.862	17.215	20.959	25.645	30.678	35.969
9.500	0.138	0.188	0.261	0.327	0.424	0.637	0.910	1.219	1.638	2.086	2.615	3.212	3.897	4.696	5.477	6.463	8.661	11.160	14.042	17.429	21.211	25.939	31.033	36.372
9.750	0.141	0.192	0.266	0.334	0.432	0.649	0.926	1.240	1.665	2.120	2.657	3.262	3.957	4.766	5.558	6.555	8.780	11.307	14.221	17.643	21.463	26.233	31.388	36.776
10.000	0.144	0.196	0.271	0.340	0.440	0.661	0.942	1.261	1.693	2.154	2.699	3.313	4.017	4.836	5.639	6.648	8.898	11.454	14.400	17.858	21.716	26.527	31.743	37.180
10.250	0.147	0.200	0.276	0.347	0.448	0.673	0.958	1.282	1.720	2.188	2.742	3.363	4.077	4.906	5.720	6.740	9.017	11.602	14.579	18.072	21.968	26.821	32.098	37.583
10.500	0.150	0.204	0.281	0.353	0.456	0.684	0.974	1.303	1.748	2.223	2.784	3.414	4.137	4.976	5.801	6.833	9.135	11.749	14.758	18.286	22.221	27.115	32.453	37.987
10.750	0.152	0.208	0.286	0.359	0.464	0.696	0.991	1.324	1.775	2.257	2.826	3.464	4.196	5.046	5.882	6.925	9.253	11.896	14.937	18.501	22.473	27.409	32.808	38.391
11.000	0.155	0.211	0.291	0.366	0.472	0.708	1.007	1.345	1.803	2.291	2.868	3.515	4.256	5.117	5.963	7.018	9.372	12.044	15.116	18.715	22.726	27.704	33.163	38.795
11.250	0.158	0.215	0.296	0.372	0.480	0.719	1.023	1.366	1.830	2.326	2.911	3.566	4.316	5.187	6.045	7.110	9.490	12.191	15.295	18.930	22.978	27.998	33.517	39.198
11.500	0.161	0.219	0.301	0.379	0.488	0.731	1.039	1.387	1.858	2.360	2.953	3.616	4.376	5.257	6.126	7.203	9.609	12.338	15.474	19.144	23.231	28.292	33.872	39.602
11.750	0.164	0.223	0.306	0.385	0.496	0.743	1.055	1.408	1.885	2.394	2.995	3.667	4.436	5.327	6.207	7.295	9.727	12.486	15.653	19.358	23.483	28.586	34.227	40.006
12.000	0.166	0.227	0.311	0.391	0.504	0.754	1.071	1.430	1.913	2.428	3.037	3.717	4.496	5.397	6.288	7.388	9.846	12.633	15.832	19.573	23.736	28.880	34.582	40.409
12.250	0.169	0.230	0.317	0.398	0.512	0.766	1.088	1.451	1.940	2.463	3.079	3.768	4.556	5.467	6.369	7.481	9.964	12.780	16.011	19.787	23.988	29.174	34.937	40.813
12.500	0.172	0.234	0.322	0.404	0.520	0.778	1.104	1.472	1.968	2.497	3.122	3.818	4.616	5.538	6.450	7.573	10.082	12.928	16.190	20.001	24.241	29.468	35.292	41.217
12.750	0.175	0.238	0.327	0.411	0.528	0.789	1.120	1.493	1.995	2.531	3.164	3.869	4.675	5.608	6.531	7.666	10.201	13.075	16.369	20.216	24.493	29.762	35.647	41.621
13.000	0.177	0.242	0.332	0.417	0.536	0.801	1.136	1.514	2.023	2.566	3.206	3.919	4.735	5.678	6.613	7.758	10.319	13.222	16.548	20.430	24.746	30.056	36.002	42.024

Length/ Dia	0.375	0.438	0.500	0.563	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000	2.250	2.500	2.750	3.000	3.250	3.500	3.750	4.000
13.250	0.180	0.246	0.337	0.424	0.544	0.813	1.152	1.535	2.050	2.600	3.248	3.970	4.795	5.748	6.694	7.851	10.438	13.370	16.727	20.644	24.998	30.351	36.357	42.428
13.500	0.183	0.249	0.342	0.430	0.552	0.824	1.169	1.556	2.078	2.634	3.291	4.020	4.855	5.818	6.775	7.943	10.556	13.517	16.906	20.859	25.250	30.645	36.712	42.832
13.750	0.186	0.253	0.347	0.436	0.560	0.836	1.185	1.577	2.105	2.668	3.333	4.071	4.915	5.888	6.856	8.036	10.674	13.664	17.086	21.073	25.503	30.939	37.067	43.235
14.000	0.189	0.257	0.352	0.443	0.568	0.848	1.201	1.598	2.133	2.703	3.375	4.122	4.975	5.959	6.937	8.128	10.793	13.811	17.265	21.288	25.755	31.233	37.422	43.639
14.250	0.191	0.261	0.357	0.449	0.576	0.859	1.217	1.619	2.160	2.737	3.417	4.172	5.035	6.029	7.018	8.221	10.911	13.959	17.444	21.502	26.008	31.527	37.777	44.043
14.500	0.194	0.265	0.362	0.456	0.584	0.871	1.233	1.640	2.188	2.771	3.460	4.223	5.095	6.099	7.100	8.313	11.030	14.106	17.623	21.716	26.260	31.821	38.132	44.447
14.750	0.197	0.268	0.367	0.462	0.592	0.883	1.250	1.661	2.215	2.806	3.502	4.273	5.154	6.169	7.181	8.406	11.148	14.253	17.802	21.931	26.513	32.115	38.487	44.850
15.000	0.200	0.272	0.372	0.468	0.600	0.895	1.266	1.682	2.243	2.840	3.544	4.324	5.214	6.239	7.262	8.498	11.267	14.401	17.981	22.145	26.765	32.409	38.842	45.254
15.250	0.203	0.276	0.377	0.475	0.608	0.906	1.282	1.704	2.270	2.874	3.586	4.374	5.274	6.309	7.343	8.591	11.385	14.548	18.160	22.359	27.018	32.704	39.197	45.658
15.500	0.205	0.280	0.383	0.481	0.616	0.918	1.298	1.725	2.298	2.908	3.628	4.425	5.334	6.380	7.424	8.683	11.503	14.695	18.339	22.574	27.270	32.998	39.552	46.061
15.750	0.208	0.284	0.388	0.488	0.624	0.930	1.314	1.746	2.325	2.943	3.671	4.475	5.394	6.450	7.505	8.776	11.622	14.843	18.518	22.788	27.523	33.292	39.907	46.465
16.000	0.211	0.288	0.393	0.494	0.632	0.941	1.331	1.767	2.353	2.977	3.713	4.526	5.454	6.520	7.586	8.868	11.740	14.990	18.697	23.002	27.775	33.586	40.261	46.869
16.250	0.214	0.291	0.398	0.500	0.640	0.953	1.347	1.788	2.380	3.011	3.755	4.576	5.514	6.590	7.668	8.961	11.859	15.137	18.876	23.217	28.028	33.880	40.616	47.273
16.500	0.217	0.295	0.403	0.507	0.648	0.965	1.363	1.809	2.408	3.046	3.797	4.627	5.574	6.660	7.749	9.053	11.977	15.285	19.055	23.431	28.280	34.174	40.971	47.676
16.750	0.219	0.299	0.408	0.513	0.656	0.976	1.379	1.830	2.435	3.080	3.840	4.678	5.633	6.730	7.830	9.146	12.096	15.432	19.234	23.646	28.532	34.468	41.326	48.080
17.000	0.222	0.303	0.413	0.520	0.664	0.988	1.395	1.851	2.463	3.114	3.882	4.728	5.693	6.801	7.911	9.238	12.214	15.579	19.413	23.860	28.785	34.762	41.681	48.484
17.250	0.225	0.307	0.418	0.526	0.672	1.000	1.412	1.872	2.490	3.148	3.924	4.779	5.753	6.871	7.992	9.331	12.332	15.727	19.592	24.074	29.037	35.056	42.036	48.887
17.500	0.228	0.310	0.423	0.533	0.680	1.011	1.428	1.893	2.518	3.183	3.966	4.829	5.813	6.941	8.073	9.423	12.451	15.874	19.771	24.289	29.290	35.351	42.391	49.291
17.750	0.231	0.314	0.428	0.539	0.688	1.023	1.444	1.914	2.545	3.217	4.008	4.880	5.873	7.011	8.154	9.516	12.569	16.021	19.951	24.503	29.542	35.645	42.746	49.695
18.000	0.233	0.318	0.433	0.545	0.696	1.035	1.460	1.935	2.573	3.251	4.051	4.930	5.933	7.081	8.236	9.608	12.688	16.168	20.130	24.717	29.795	35.939	43.101	50.098
18.250	0.236	0.322	0.438	0.552	0.704	1.046	1.476	1.957	2.600	3.286	4.093	4.981	5.993	7.151	8.317	9.701	12.806	16.316	20.309	24.932	30.047	36.233	43.456	50.502
18.500	0.239	0.326	0.444	0.558	0.712	1.058	1.492	1.978	2.628	3.320	4.135	5.031	6.053	7.222	8.398	9.793	12.924	16.463	20.488	25.146	30.300	36.527	43.811	50.906
18.750	0.242	0.329	0.449	0.565	0.720	1.070	1.509	1.999	2.655	3.354	4.177	5.082	6.112	7.292	8.479	9.886	13.043	16.610	20.667	25.361	30.552	36.821	44.166	51.310
19.000	0.245	0.333	0.454	0.571	0.728	1.081	1.525	2.020	2.683	3.388	4.220	5.132	6.172	7.362	8.560	9.978	13.161	16.758	20.846	25.575	30.805	37.115	44.521	51.713
19.250	0.247	0.337	0.459	0.577	0.736	1.093	1.541	2.041	2.710	3.423	4.262	5.183	6.232	7.432	8.641	10.071	13.280	16.905	21.025	25.789	31.057	37.409	44.876	52.117
19.500	0.250	0.341	0.464	0.584	0.744	1.105	1.557	2.062	2.738	3.457	4.304	5.233	6.292	7.502	8.722	10.163	13.398	17.052	21.204	26.004	31.310	37.704	45.231	52.521
19.750	0.253	0.345	0.469	0.590	0.752	1.117	1.573	2.083	2.765	3.491	4.346	5.284	6.352	7.572	8.804	10.256	13.517	17.200	21.383	26.218	31.562	37.998	45.586	52.924
20.000	0.256	0.348	0.474	0.597	0.760	1.128	1.590	2.104	2.793	3.526	4.388	5.335	6.412	7.643	8.885	10.348	13.635	17.347	21.562	26.432	31.814	38.292	45.941	53.328
20.250	0.258	0.352	0.479	0.603	0.768	1.140	1.606	2.125	2.820	3.560	4.431	5.385	6.472	7.713	8.966	10.441	13.753	17.494	21.741	26.647	32.067	38.586	46.296	53.732
20.500	0.261	0.356	0.484	0.610	0.776	1.152	1.622	2.146	2.848	3.594	4.473	5.436	6.532	7.783	9.047	10.534	13.872	17.642	21.920	26.861	32.319	38.880	46.651	54.136
20.750	0.264	0.360	0.489	0.616	0.784	1.163	1.638	2.167	2.875	3.629	4.515	5.486	6.592	7.853	9.128	10.626	13.990	17.789	22.099	27.075	32.572	39.174	47.006	54.539
21.000	0.267	0.364	0.494	0.622	0.792	1.175	1.654	2.188	2.902	3.663	4.557	5.537	6.651	7.923	9.209	10.719	14.109	17.936	22.278	27.290	32.824	39.468	47.360	54.943
21.250	0.270	0.368	0.499	0.629	0.800	1.187	1.671	2.210	2.930	3.697	4.600	5.587	6.711	7.993	9.291	10.811	14.227	18.084	22.457	27.504	33.077	39.762	47.715	55.347
21.500	0.272	0.371	0.504	0.635	0.808	1.198	1.687	2.231	2.957	3.731	4.642	5.638	6.771	8.064	9.372	10.904	14.346	18.231	22.636	27.719	33.329	40.056	48.070	55.750
21.750	0.275	0.375	0.510	0.642	0.816	1.210	1.703	2.252	2.985	3.766	4.684	5.688	6.831	8.134	9.453	10.996	14.464	18.378	22.816	27.933	33.582	40.351	48.425	56.154
22.000	0.278	0.379	0.515	0.648	0.824	1.222	1.719	2.273	3.012	3.800	4.726	5.739	6.891	8.204	9.534	11.089	14.582	18.525	22.995	28.147	33.834	40.645	48.780	56.558
22.250	0.281	0.383	0.520	0.654	0.832	1.233	1.735	2.294	3.040	3.834	4.769	5.789	6.951	8.274	9.615	11.181	14.701	18.673	23.174	28.362	34.087	40.939	49.135	56.962
22.500	0.284	0.387	0.525	0.661	0.840	1.245	1.752	2.315	3.067	3.869	4.811	5.840	7.011	8.344	9.696	11.274	14.819	18.820	23.353	28.576	34.339	41.233	49.490	57.365
22.750	0.286	0.390	0.530	0.667	0.848	1.257	1.768	2.336	3.095	3.903	4.853	5.891	7.071	8.414	9.777	11.366	14.938	18.967	23.532	28.790	34.592	41.527	49.845	57.769
23.000	0.289	0.394	0.535	0.674	0.856	1.268	1.784	2.357	3.122	3.937	4.895	5.941	7.130	8.485	9.859	11.459	15.056	19.115	23.711	29.005	34.844	41.821	50.200	58.173
23.250	0.292	0.398	0.540	0.680	0.864	1.280	1.800	2.378	3.150	3.971	4.937	5.992	7.190	8.555	9.940	11.551	15.174	19.262	23.890	29.219	35.097	42.115	50.555	58.576
23.500	0.295	0.402	0.545	0.686	0.872	1.292	1.816	2.399	3.177	4.006	4.980	6.042	7.250	8.625	10.021	11.644	15.293	19.409	24.069	29.433	35.349	42.409	50.910	58.980
23.750	0.298	0.406	0.550	0.693	0.880	1.303	1.833	2.420	3.205	4.040	5.022	6.093	7.310	8.695	10.102	11.736	15.411	19.557	24.248	29.648	35.601	42.704	51.265	59.384
24.000	0.300	0.409	0.555	0.699	0.888	1.315	1.849	2.441	3.232	4.074	5.064	6.143	7.370	8.765	10.183	11.829	15.530	19.704	24.427	29.862	35.854	42.998	51.620	59.788